ABSTRACT

Title: Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse – Phase II

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OBJECTIVES

U.S. electric utilities are a large user of water. New regulations to diminish the effect of power generation on aquatic life will mean, that Utilities will have to retrofit from the once-through cooling technology, to recirculating cooling towers, and to reclaim/reuse discharged water throughout the power-plant (e.g., boiler blow-down water). Concerns exist today, in particular, about heavy metals, such as Hg, As and Se, found in many of the power-plant effluents. Most of these streams fall today under the category of high volume, "too clean to clean" effluents. They require highly efficient treatment techniques, particularly for the removal of trace-level metal contaminants. Little emphasis, so far, has been placed on such discharges. The focus of the project is on treating and reusing such effluents, particularly on dealing with Se and As impacted boiler blow-down streams.

ACCOMPLISHMENTS TO DATE

The focus during the first quarter is on Task 1 of the project which involves the "*Study of the Removal of As and Se from Model and Real Boiler Blow-down Streams in Flow Columns."* During Phase I of our project, equilibrium uptakes and kinetics were investigated in batch experiments. The emphasis in Phase II will shift to measuring kinetics and adsorption rates in flow experiments utilizing packed-bed columns. During Task 1, the uptake rates will be measured first using surrogate boiler blow-down waters as a function of heavy metal concentration, temperature, pH and space times. Of interest will be whether the equilibrium uptakes, measured in the batch experiments, are consistent with those measured in flow experiments. Verification of the maximum capacity reduction as a result of the competing ions, determined via batch testing, is another focus. Upon completion of the experiments with simulated effluents, we will initiate experiments with real

effluents. The goal here is to validate the effects observed with the simulated effluents with the data with real effluents. During the first quarter of the project we have set-up and tested the experimental system. We have operated a number of packed-bed flow columns simultaneously in order to investigate a variety of effluents.

FUTURE WORK

During the remaining three quarters we will carry out the following Tasks:

Quarter 2: We will measure adsorption rates in flow experiments.

Quarter 3: We will study the effect on adsorption of heavy metal concentration, temperature, pH and space times. Of interest will be whether the equilibrium uptakes, measured in the batch experiments, are consistent with those measured in the flow experiments.

Quarter 4: We will validate the flow-column model. The goal here is to develop a data-validated simulation code, which is to be used in the design and optimization of field-scale columns and devices.

LIST OF PAPER PUBLISHED

None, so far.

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